

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of the claims in the application.

1. (Currently Amended) A bone cement composition comprising

a calcium component₁ and

a liquid component₁ in which the liquid component comprising comprises a mixture of pyrophosphate ions and at least one of the following: orthophosphate ions and/or water.
2. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim 1, comprising between ~~0.8 g to 3.0 g~~ 0.8 g to 3.0 g of the calcium component to ~~4 ml~~ each 1 ml of the liquid component.
3. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim 1, comprising between ~~1.5 g to 2.5 g~~ 1.5 g to 2.5 g of the calcium component to ~~4 ml~~ each 1 ml of the liquid component.
4. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim 1, ~~wherein~~ where the calcium component is a solid in ~~the 10 nm to 100 μm~~ a primary particle size range of 10 nm to 100 μm.
5. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim 1, ~~wherein~~ where the calcium component is [[a]] calcium phosphate.
6. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim 1, ~~wherein~~ where the calcium component comprises at least one of ~~the following: β-tricalcium phosphate (β-TCP), α-tricalcium phosphate (α-TCP), tetracalcium phosphate (TTCP), dicalcium phosphate anhydrous (DCPA), dicalcium phosphate dihydrate (DCPD), hydroxyapatite (HA) or calcium oxide (CaO).~~

7. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 1, ~~wherein where the~~ a source of ~~the~~ pyrophosphate ions is pyrophosphoric acid or [[a]] sodium pyrophosphate.

8. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 1, ~~wherein the liquid component further comprises the~~ a source of orthophosphate ions ~~[[is]]~~ or orthophosphoric acid.

9. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 7, ~~wherein where~~ the liquid component comprises ~~no more than~~ between 0 and 90% of water by weight.

10. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 7, ~~wherein where~~ the liquid component comprises at least 10% ~~of pyrophosphoric acid or~~ the source of ~~the~~ pyrophosphate ions by weight.

11. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 7, ~~wherein where~~ the liquid component comprises no more than 85% ~~of pyrophosphoric acid or~~ the source of ~~the~~ pyrophosphate ions by weight.

12. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 7, ~~wherein where~~ the liquid component further comprises at least 5% of orthophosphoric acid or a source of orthophosphate ions by weight.

13. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 7, ~~wherein where~~ the liquid component further comprises no more than 85% orthophosphoric acid or a source of orthophosphate ions by weight.

14. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim ~~[[7]]~~ 13, ~~wherein the liquid component comprises comprising water within the range 0 to 90% by weight of water, pyrophosphoric acid 10 to 80% by weight of pyrophosphoric acid and orthophosphoric acid 5 to 80% by weight of orthophosphoric acid.~~

15. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim ~~[[7]]~~ 13, wherein the liquid component comprises ~~comprising water within the range 30 to 80% by weight of water, pyrophosphoric acid 10 to 80% by weight of pyrophosphoric acid and orthophosphoric acid 5 to 40% by weight of orthophosphoric acid.~~

16. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim ~~[[7]]~~ 13, wherein the liquid component comprises ~~comprising water within the range 0 to 90% by weight of water, pyrophosphoric acid 10 to 80% by weight of pyrophosphoric acid and orthophosphoric acid 5 to 40% by weight of orthophosphoric acid.~~

17. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim ~~[[7]]~~ 13, wherein the liquid component comprises ~~comprising water within the range 45 to 80% by weight of water, pyrophosphoric acid 10 to 50% by weight of pyrophosphoric acid and orthophosphoric acid 5 to 40% by weight of orthophosphoric acid.~~

18. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim 1, further comprising a setting retardant.

19. (Currently Amended) [[A]] The bone cement composition ~~according to~~ of claim ~~[[1]]~~ 18, wherein ~~where~~ the setting retardant comprises at least one of the following: ~~Chitosan~~ chitosan, calcium sulphate hemihydrate, trisodium citrate, sodium acetate, sodium glycolate, sodium lactate, non-toxic orthophosphate salts~~[[,]]~~ or phosphate buffered saline.

20. (Currently Amended) ~~A process for manufacturing a~~ The bone cement ~~of a~~ composition ~~according to~~ of claim 1 ~~where~~, obtained by a process comprising compacting the composition ~~components are compacted to~~ under a pressure between ~~0MPa and 100MPa~~ 0 MPa and 100 MPa prior to setting.

21. (Currently Amended) [[A]] The bone cement composition of claim 1, wherein ~~comprising a calcium component and a~~ the liquid component ~~comprising~~ further comprises a solution of a polyphosphate salt.

22. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 21, wherein where the calcium component is calcium hydroxide.

23. (Currently Amended) [[A]] ~~The~~ bone cement composition ~~according to~~ of claim 21, wherein the polyphosphate salt is sodium tripolyphosphate.

24. (New) A bone cement composition comprising
a calcium component,

a liquid component comprising pyrophosphate ions and water, and

a setting retardant.

25. (New) The bone cement composition of claim 24, wherein the bone cement composition has a setting time of 1 min to 30 min.

26. (New) The bone cement composition of claim 24, wherein the setting retardant comprises at least one of chitosan, calcium sulphate hemihydrate, trisodium citrate, sodium acetate, sodium glycolate, sodium lactate, non-toxic orthophosphate salts or phosphate buffered saline.

27. (New) The bone cement composition of claim 24, wherein the setting retardant is selected from the group consisting of chitosan, calcium sulphate hemihydrate, trisodium citrate, sodium acetate, sodium glycolate, sodium lactate, non-toxic orthophosphate salts, phosphate buffered saline, and a combination of two or more thereof.

28. (New) The bone cement composition of claim 24, wherein the liquid component further comprises orthophosphate ions.

29. (New) A bone cement composition comprising
a calcium component selected from the group consisting of β -tricalcium phosphate (β -TCP), α -tricalcium phosphate (α -TCP), tetracalcium phosphate (TTCP), dicalcium

phosphate anhydrous (DCPA), dicalcium phosphate dihydrate (DCPD), hydroxyapatite (HA), calcium oxide (CaO), and a combination of two or more thereof, and

a liquid component comprising pyrophosphoric acid, orthophosphoric acid and water.

30. (New) The bone cement composition of claim 29, wherein the bone cement composition has a setting time of about 1 to 30 min.

31. (New) The bone cement composition of claim 29, wherein the bone cement composition comprises between 0.8 to 3.0 g of the calcium component to 1 ml the liquid component.

32. (New) The bone cement composition of claim 29, wherein the bone cement composition comprises between 1.5 to 2.5 g of the calcium component to 1 ml of the liquid component.

33. (New) The bone cement composition of claim 29, wherein the liquid component comprises 90% or less by weight of water, 10 to 80% by weight of orthophosphoric acid and 5 to 40% by weight of pyrophosphoric acid.

34. (New) The bone cement composition of claim 29, wherein the liquid component comprises 45 to 80% by weight of water, 10 to 50% by weight of orthophosphoric acid and 5 to 40% by weight of pyrophosphoric acid.

35. (New) The bone cement composition of claim 29, further comprising a setting retardant, wherein the setting retardant comprises at least one of chitosan, calcium sulphate hemihydrate, trisodium citrate, sodium acetate, sodium glycolate, sodium lactate, non-toxic orthophosphate salts or phosphate buffered saline.

36. (New) The bone cement composition of claim 29, wherein the setting retardant is selected from the group consisting of chitosan, calcium sulphate hemihydrate, trisodium citrate, sodium acetate, sodium glycolate, sodium lactate, non-toxic orthophosphate salts, phosphate buffered saline, and a combination of two or more thereof.

37. (New) The bone cement composition of claim 24, wherein the calcium component is selected from the group consisting of β -tricalcium phosphate (β -TCP), α -tricalcium phosphate (α -TCP), tetracalcium phosphate (TTCP), dicalcium phosphate anhydrous (DCPA), dicalcium phosphate dihydrate (DCPD), hydroxyapatite (HA), calcium oxide (CaO), and a combination of two or more thereof..

38. (New) A bone cement composition obtained by a process comprising:

mixing

a calcium component selected from the group consisting of β -tricalcium phosphate (β -TCP), α -tricalcium phosphate (α -TCP), tetracalcium phosphate (TTCP), dicalcium phosphate anhydrous (DCPA), dicalcium phosphate dihydrate (DCPD), hydroxyapatite (HA), calcium oxide (CaO), and a combination of two or more thereof, and

a liquid component comprising pyrophosphoric acid, orthophosphoric acid and water; and

upon mixing, allowing the calcium component and the liquid component of the bone cement to set to form a solid.

39. (New) The bone cement composition of claim 38, wherein the bone cement composition has a setting time of about 1 to 30 min.

40. (New) A process of obtaining a bone cement composition comprising:

mixing

a calcium component selected from the group consisting of β -tricalcium phosphate (β -TCP), α -tricalcium phosphate (α -TCP), tetracalcium phosphate (TTCP), dicalcium phosphate anhydrous (DCPA), dicalcium phosphate dihydrate (DCPD), hydroxyapatite (HA), calcium oxide (CaO), and a combination of two or more thereof, and

a liquid component comprising pyrophosphoric acid, orthophosphoric acid and water; and

upon mixing, allowing the calcium component and the liquid component of the bone cement to set to form a solid.